

# Chapter 1

## About the System

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## How the Manual is Organized

**Chapter 1** (*About the System*) discusses the organization of the manual as well as the common terms and conventions used in the manual. It also discusses the features and benefits of the instrument, and the instrument specifications and gas requirements.

**Chapter 2** (*The System Software*) discusses the Windows environment as well as the system software.

**Chapter 3** (*By Window*) provides an alphabetical listing of all the windows known to the system. Each window in the software is described.

**Chapter 4** (*Alphabetical*) lists each selection from each window in alphabetical order.

**Chapter 5** (*Using Grids*) discusses how to use a grid to analyze an image.

**Chapter 6** (*Using Groups of Regions*) discusses how to use a region(s) to analyze an image.

**Chapter 7** (*Using Lanes*) discusses how to use lanes to analyze an image.

**Chapter 8** (*Profile 1D Analysis*) discusses how to use 1D lane profiles to analyze an image.

**Chapter 9** (*Printing Images*) discusses how to print images from the screen.

**Chapter 10** (*Reporting Results*) discusses how to generate the grid, region, and lane template reports.

**Chapter 11** (*Maintenance and Troubleshooting*) discusses the maintenance procedures and the calibration you can follow to keep the instrument in good working condition.

This chapter provides a list of operational problems that can be encountered when you are operating the instrument. Listed with each problem is the associated corrective action.

An alphabetical list of all system messages and their corrective actions are listed.

**Chapter 12** (*Calibration*) presents the instrument calibration procedure.

## Selecting and Choosing a Menu

In the InstantImager software (as well as in Windows), you select (highlight) a menu and then choose a menu item from the menu. Choosing the menu item carries out the action.

To select a menu using the mouse:

- ☐ Using the mouse pointer, point to the name of the menu on the menu bar, and click the left mouse button. This opens the menu.

To close a menu:

- ☐ Click anywhere outside the menu.

## Choosing a Menu Item

Menu items are most often commands. These commands can initiate a function or display a window from which you can initiate a function.

To choose an item from a selected menu:

- ☐ Select the item.

Or type the letter that is underlined in the item name.

Or, use the **Up Arrow** and **Down Arrow** keys until you reach the item you want to select, and then press **<Enter>**.

Or, drag the highlight bar down the menu until the menu item is highlighted, and then release the mouse button.

## Keyboard Shortcuts

Shortcut keys can be used to carry out some menu commands. Shortcut-key combinations are listed to the right of a menu item. Instead of opening the menu and choosing a command, you simply press the key combination.

## Standard Terms and Conventions

This section explains some of the basic terminology and techniques that are referred to throughout this manual. Other terms are explained as they are introduced in the text.

| TERM          | MEANING                                                                                                                                                                                                                                                            |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Select        | Move the pointer on the screen to the item and quickly press and release the left mouse button. Makes an item or object active for execution or editing.                                                                                                           |
| Click         | Quickly press and release the left mouse button.                                                                                                                                                                                                                   |
| Double Click  | Click the mouse button twice in rapid succession.                                                                                                                                                                                                                  |
| Drag          | To hold down the mouse button while you move the mouse.                                                                                                                                                                                                            |
| Button        | You select a button to initiate an immediate action, such as carrying out or cancelling a command. The <b>OK</b> , <b>CANCEL</b> , and <b>HELP</b> buttons are common command buttons. They are often located along the bottom or on the right side of the window. |
| Entry Box     | You enter information into an entry box. When you move to an empty entry box, an insertion point (text cursor) appears at the far left side of the box. The text you type starts at the insertion point.                                                           |
| Option Button | Option buttons represent mutually exclusive options. You select only one option at a time. The selected option button contains a black dot. Unavailable options are dimmed.                                                                                        |
| Check Box     | A check box next to an option means you can select or clear the option. You can select as many check box options as needed. When a check box is selected, it contains an X. Names of unavailable options are dimmed.                                               |
| Text Cursor   | Refers to the vertical line cursor that indicates the location in the window where characters are currently being added or deleted.                                                                                                                                |

## **Menu Conventions**

There are a number of menu conventions the InstantImager software borrows from Windows. For example, some menu items may have a check mark, an ellipsis (...), or a key combination next to them. Other menu items may be dimmed.

The following menu conventions are used in the InstantImager software:

| <b>MENU CONVENTION</b>           | <b>MEANING</b>                                                                                                                                       |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimmed command                   | You may not use the command with your application at the current time. (For example, you may need to select another item before using this command.) |
| Ellipsis (...) following command | A window appears when you choose the command. The window contains options you need to select before the command is carried out.                      |
| Key combination next to command  | The key combination is a shortcut for this command. You can use this key combination to execute the command.                                         |

## Notational Conventions

To help you understand how to respond to specific selections, this manual uses the following format:

### SELECTION

### DESCRIPTION OF USE

#### **Protocol File:**

Enter the name of the protocol file. Be sure to include an extension of .PRO.

The selections in a specific window will be listed in the order of required response at the left side of the page. The answer and its description are presented directly opposite the selection. Selections can include buttons, option buttons, input boxes, and check boxes.

## About the InstantImager

The InstantImager is a fully automated system which analyzes and quantifies the radioactive distribution of flat samples. The system is designed to process and display images for which levels of radioactivity or molecular weight are required.

The heart of the InstantImager is the patented microchannel array detector providing extremely efficient high-resolution radioactivity detection.

The imaging area of the instrument's detector is 20 x 24 centimeters and represents the maximum area of the sample the detector can cover. Any portion of a sample that exceeds this dimension will not be displayed.

Example applications include:

- Blots and gels.
- TLC plates.
- Tissue sections.

The InstantImager uses electronic autoradiography to visualize radioactive patterns on these samples.



## **The InstantImager Concept**

The InstantImager creates image patterns of radioactivity directly from blots or other types of samples. Samples can be labeled with Phosphorus-32, Phosphorus-33, Carbon-14, Iodine-125, Sulfur-35. A sample that would normally take days to see with X-ray film, can be imaged in just a few minutes. Overnight exposures are reduced to just 30 minutes. The instrument increases your laboratory productivity by reducing the time to get results.

The InstantImager enables you to analyze southern, northern, dot and slot blots, TLC plates, thin or dried gels, or filters for plaque or colony screenings. The instrument provides an autoradiogram-like image on a high resolution monitor.

### **Immediate Analysis**

As the image is being acquired, you can use the InstantImager software to quantify blots by using templates of grids, regions, or lanes right on your screen. Using templates eliminates hours of time and effort scanning films with a densitometer.

### **Determine Molecular Weight**

The molecular weight of samples can also be determined. Once the image has been acquired, you can use the template to create a series of lanes over each band on the image. Once the lanes have been created, you can assign molecular weights to a series of standards. A plot of the migration distance versus size is then calculated and stored for later reference. Finally, the position of each unknown band is marked, and its size determined automatically from the standards displayed on the screen.

### **Print and Save the Image**

Optional high-resolution printers can be used to produce full-size video printouts of the image.

Images and data can be transferred from the instrument's hard disk to either a floppy disk or an optional optical hard disk for long term storage. This method of storing files is more convenient than autoradiographs and reduces filing time, expense and risk of losing "original" films.

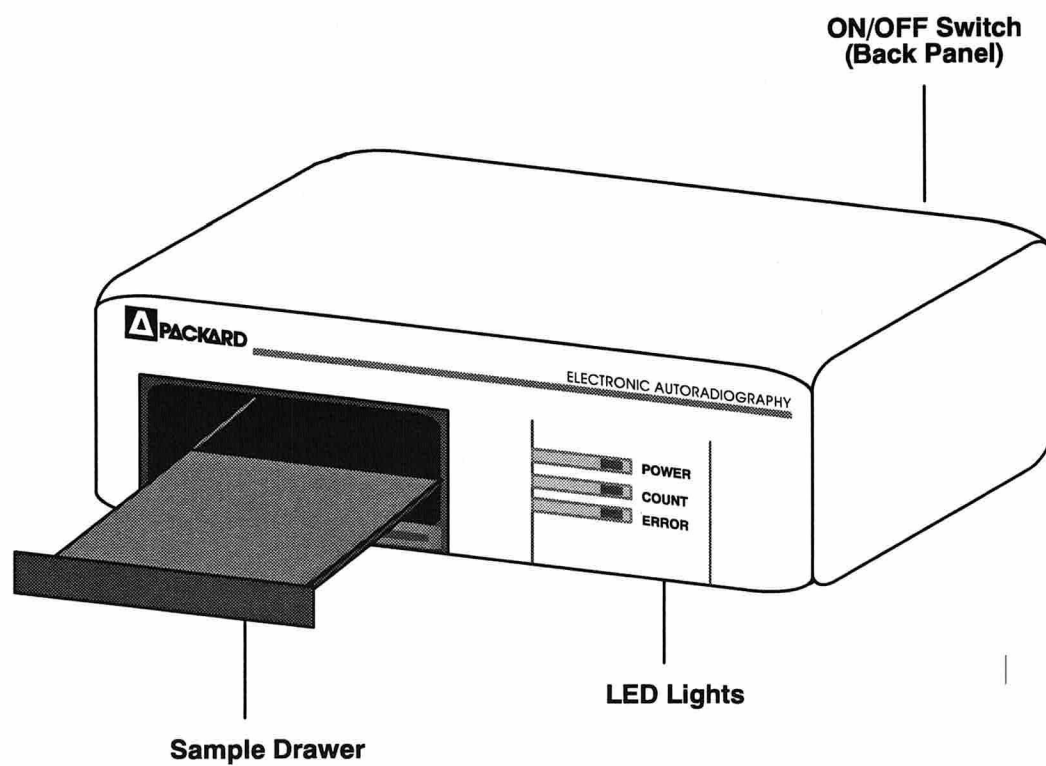


## Overview of the System Hardware

The system is controlled by an IBM compatible computer that includes a color monitor. Image printouts are generated on optional high-resolution printers. The computer is connected to the instrument through a serial link.

The basic components of the InstantImager pictured in Figure 1-1 are described below:

1. **Sample Drawer:** The sample drawer is pulled out for sample loading. Samples must be covered with a sample cover. The sample is loaded by pushing in the drawer; the sample is then automatically elevated to the detector for counting.  
See Figure 1-2 for a detailed picture of the sample drawer.
2. **LED Lights:** Power light, Count light, Error light.  
The power light remains lit when the instrument is turned on. The light goes out when the instrument is turned off.  
The count light remains lit while an image is being acquired.  
The error light remains lit if an error occurs; such as an open sample drawer.
3. **On/Off Switch:** The instrument can be turned on and off by flipping the switch on the back panel of the instrument.



**Figure 1-1. InstantImager Components.**

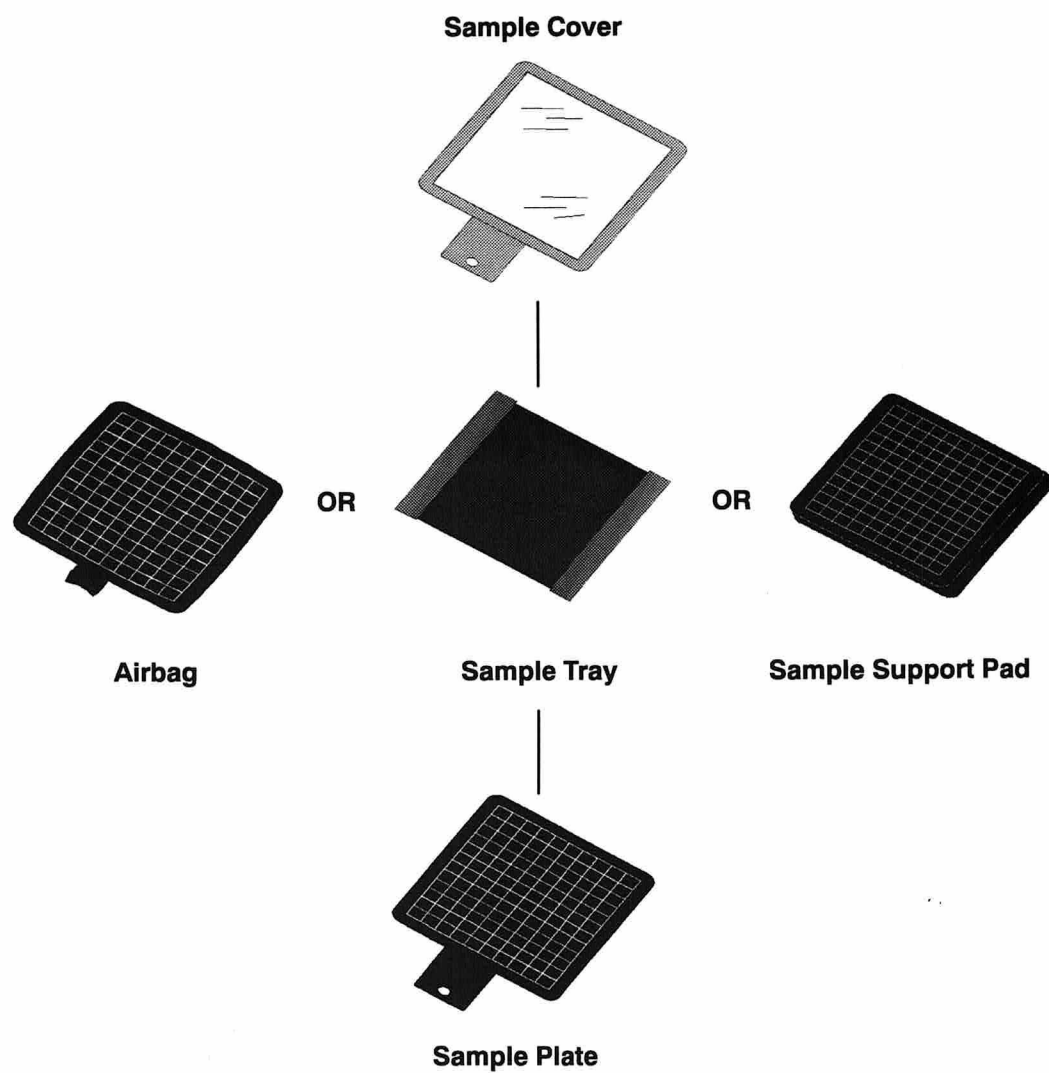
### Sample Drawer and Related Accessories

The sample drawer can be pulled in and out of the instrument, but cannot be removed from the instrument. The sample drawer consists of an integral sample plate and several removable accessories. Samples can be placed directly on the sample plate or on top of the airbag, sample tray, or sample support pad accessories. All samples should then be covered by the sample cover accessory.

The sample drawer (Figure 1-2) is comprised of the following items:

1. **Sample Plate:** The sample plate cannot be removed from the drawer. You can place the sample on the sample plate.  
A cover can optionally be placed on top of the sample plate to protect the sample plate from contamination.  
A grid is etched into the surface of the sample plate. The grid enables you to determine the position of the sample relative to the screen. When the sample sits on the plate, the left rear corner of the sample (as you face the instrument) corresponds to the upper left corner of the screen.
2. **Sample Tray:** The removable sample tray fits comfortably on the sample plate and allows you to prepare a sample away from the instrument. The sample can be prepared directly on top of the tray. Once the sample has been prepared, place the sample tray on top of the sample plate.  
**Airbag:** The airbag also fits comfortably on the sample plate. A silk screened image of the grid that appears on the sample plate also appears on the airbag. Place the sample directly on the airbag.  
**Sample Support Pad:** The sample support pad fits comfortably on the sample plate. A silk screened image of the grid that appears on the sample plate also appears on the sample support pad. Place the sample directly on the pad.
3. **Sample Cover:** The sample cover is placed on top of the sample. The sample cover is a clear plastic sheet in a plastic frame. The sample cover protects the detector from contamination.  
The sample cover is secured at the base of the sample plate.

See the section *Sample Preparation Guidelines* below, for more information on how to protect the detector from damage.



**Figure 1-2. Sample Drawer and Related Accessories.**

## Instrument Specifications

All instrument specifications given below are confirmed by Packard Instrument Co. reference methods at Downers Grove, Illinois, U.S.A.

### Physical Dimensions

|         |                    |
|---------|--------------------|
| Height: | 24.13 cm (9.5 in)  |
| Width:  | 67.31 cm (26.5 in) |
| Depth:  | 59.69 cm (23.5 in) |
| Weight: | 68 kg (150 lbs)    |

### Electrical Requirements

117 VAC + or - 10%, 50/60 Hz, 4.0 amp protection

220 VAC + or - 10%, 50/60 Hz, 2.5 amp protection.

Power consumption 200 VA maximum, instrument only.

### Environmental Requirements

Operating Ambient

Temperature: 15° C to 35° C  
59° F to 90° F

Operating Relative Humidity: 30% to 85%

The instrument should be located away from all sources of radiation (X-ray equipment, radiation storage vaults, etc).

## Detector

Oxford Positron Detector with a detector area of 20cm X 24cm.

To prevent corrosion damage and arcing, the detector must remain filled with counting gas or CO<sub>2</sub> at all times. Neglecting to maintain the system on gas, even when stored and not in use, may void the warranty on the detector if a failure is identified as due to the lack of gas.

## Gas Requirements

 **Note:** *The detector must remain filled either with counting gas or CO<sub>2</sub> at all times.*

Table 1-1 describes the recommended InstantImager gas requirements including the composition of the gas bottle contents, tolerance factors, and purity percentages.

Table 1-2 describes the composition (ppm) of the residual impurities found in the Carbon Dioxide and the Isobutane.

**Table 1-1. Gas Requirements.**

| Gas            | % Total Composition (of gas bottle) | % Tolerance | % Purity              |
|----------------|-------------------------------------|-------------|-----------------------|
| Carbon Dioxide | 2.5%                                | -5%/+10%    | Bone dry 99.8%        |
| Isobutane      | 1.0%                                | -5%/+5%     | Chemically pure 99.0% |
| Argon          | 96.5% or remainder of gas in bottle | NA          | Pre-purified 99.98%   |

**Table 1-2. Impurities.**

| Gas                          | Impurities (ppm)                                    |
|------------------------------|-----------------------------------------------------|
| Carbon Dioxide and Isobutane | < 100-150 ppm of air<br>< 5-50 ppm H <sub>2</sub> O |

## Gas Pressure

Normal operating pressure: 32 to 35 psi (220 to 240 kPa).

Maximum operating pressure: 50 psi (345 kPa).

You should replace the gas tank when it reaches 100 psi (690 kPa).

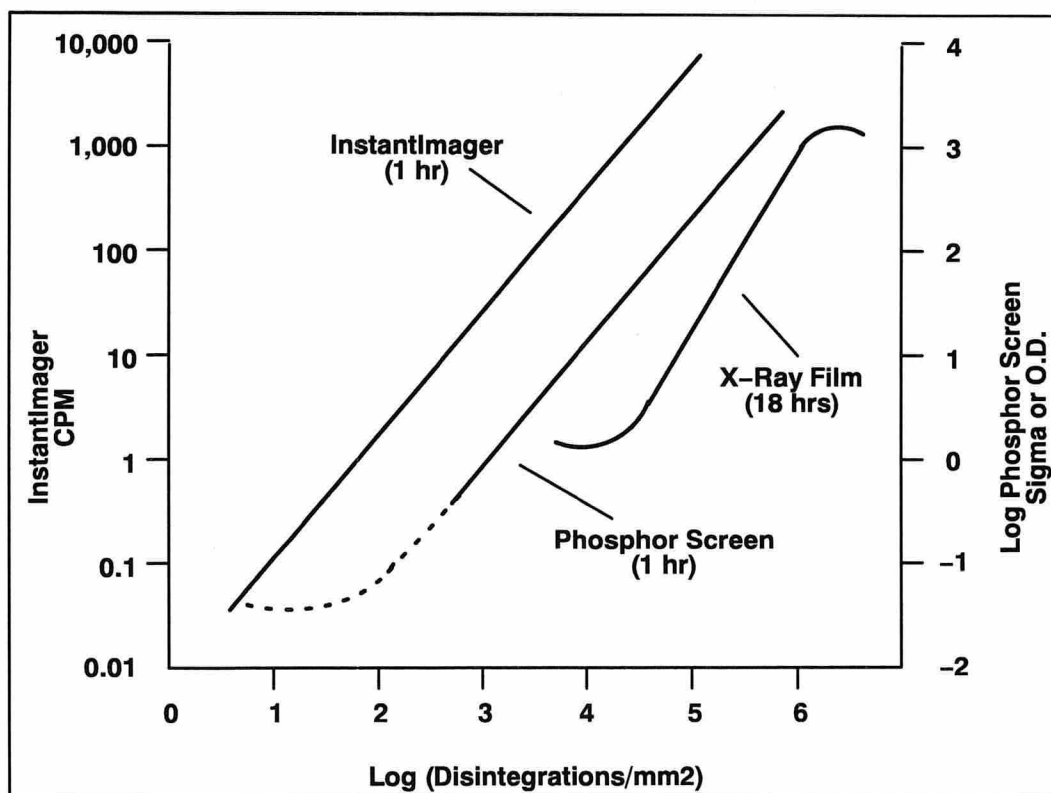
## Typical Performance Specifications

All performance specifications given below are confirmed by Packard Instrument Company reference methods at Downers Grove, Illinois, U.S.A.

### Efficiency of Detection

|                 |      |
|-----------------|------|
| $^{32}\text{P}$ | 25%  |
| $^{35}\text{S}$ | 2.0% |
| $^{14}\text{C}$ | 1.5% |

### Linearity of Response





## Background

$<0.015 \text{ CPM/mm}^2$

## Detection Threshold 14C

$0.75 \text{ DPM/mm}^2$  in 30 minutes

$0.20 \text{ DPM/mm}^2$  in 16 hours

## Uniformity

$\pm 5\%$

## Resolution

|                      |                |
|----------------------|----------------|
| Normal resolution    | 0.5 mm pixels  |
| High resolution mode | 0.25 mm pixels |

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